Facilitating Malaysia Towards Innovative Society: Arguing the Case for Open Access Policy

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Abstract

The Malaysian National Innovation Model blueprint states that there is an urgent need to pursue an innovation-oriented economy to improve the nation's capacity for knowledge, creativity and innovation. In nurturing a pervasive innovation culture, the Malaysian government has declared the year 2010 as an Innovative Year whereby creativity among its population is highly celebrated. However, while Malaysian citizens are encouraged to be creative and innovative, scientific data and information generated from publicly funded research in Malaysia is locked up because of rigid intellectual property licensing regimes and traditional publishing models. Reflecting on these circumstances, this paper looks at, and argue why, scientific data and information should be made available, accessible and re-useable freely to promote the grassroots level of innovation in Malaysia. Using innovation theory as its platform of argument, this paper calls for an open access policy for publicly funded research output to be adopted and implemented in Malaysia. Simultaneously, a normative analytic approach is used to determine the types of open access policy that ought to be adopted to spur greater innovation among Malaysians.

Keywords- ***innovation; open access; public research; policy***

I. MALAYSIA AIM TOWARDS INNOVATIVE SOCIETY

As Malaysia is paving her way towards developed nation status by 2020, the government is fully aware that it should move the nation towards an innovation-based economy to ensure the economy remains competitive and sustainable in the future. Innovation leads to productivity gains, which in turn leads to economic growth. Under the Malaysian 10th Development plan, which runs from 2011 to 2015, various incentives have been introduced in order to transform the nation into a hub of creativity and innovation. This includes various innovation enablers, such as quality education, public funding for research, as well as information and communication technology (ICT) infrastructure.

Having an innovative society is a vital element in any nation's progress towards its goal of generating an innovative economy. The Malaysia Innovative 2010 campaign is the manifestation of the country's aspiration in creating creative and innovative society to serve the economic end. The focus of the campaign is to formulate innovative Malaysians across a wide spectrum of society which includes youngsters in schools and universities, the professionals and technocrat in the industries, as well as the non-governmental organisations and the administrators in the public sectors.[1]

The existence of an innovative society within a country could be measured by the number of patents as well as the amount of innovation output owned and produced by its citizens. Judging by the number of patents owned by Malaysian citizens, it is obvious that Malaysia is still far-off from having an innovative society as envisaged in the blueprint of the National Innovation Model. Though it is ranked at 31st place in the number of patents ownership list, the spot actually stands at 4.237 patents per million populations, which is a lot lower compared to 1,274,533 in Japan, 359.840 in the USA, or even Australia, which has 73.511 patents per million of its populations.[2]

Further, while Malaysia is ranked at 25th place from 132 countries in Global Innovation Index Report 2009-2010, in term of capacity for knowledge creation, publication, innovation and creative output, Malaysia is ranked at 34th, 72nd, 30th and 52nd places respectively.[3] This shows that further initiative is required to drive the Malaysian society to transform itself as an innovative society. Undoubtedly, part of this initiative could increase the access to and re-use of vital innovation inputs such as the scientific data and information produced through public research funding incentives.

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[1] Anonymous, Programmes to Create an Innovative Society, January 18, 2010<,http://thestar.com.my/news/story.asp?file=/2010/1/18/nation/5493723&sec=nation > (at 5 October 2010)

[2] Economist Intelligence Unit 2009, <http://graphics.eiu.com/PDF/Cisco_Innovation_Complete.pdf> (at 7 October 2010)

[3] INSEAD, Global Innovation Index 2009-2010, <http://www.globalinnovationindex.org/gii/main/analysis/showcountrydetails.cfm?countryid=74&regionid=3 >(at 7 October 2010)

II. SCIENTIFIC DATA AND INFORMATION LOCKED-UP

Like other World Intellectual Property Organisation (WIPO) member countries, Malaysia has enacted legislations for copyright, patents and industrial designs to protect the rights of the scientists and researchers. Under this intellectual property (IP) legislations, access to and re-use of scientific data and information are subject to the exclusive rights conferred on owners of IP. This includes the exclusive rights over research output through the public funding that according to Organisation for Economic Co-Operation and Development (OECD) should be made available and accessible to the public.

Within the domain of these exclusive rights, the public liberty to access and re-use the scientific data and information depends on the terms and conditions, which are imposed by the owners of the research output. These terms and conditions dictate the extent of further reproduction, development and exploitation of the scientific data and information, which are being protected as the researchers IP.

There is no obligation for the IP owners to grant permission for their scientific data and information to be accessed and re-used even with payment or fair compensation unless they are compelled to do so either by the law or policy. The universities and public research institutions in the United States (US), the United Kingdom (UK), the European Union (EU), Australia and many other countries have already granted open access, which allows access to and re-use of publicly funded scientific data and information. This similar trend however, has not been adhered to by their Malaysian counterparts.

In the absence of such laws or policies, the recipients of publicly funded research grants are under no requirement or responsibility to publish or self-archive their scientific data and information as open access materials. Instead, they are free to publish their academic papers in subscription based, closed-access electronic as well as printed academic journals. This may eventually create IP legal constraints on public access to scientific data and information and disintegrate their rights to utilise and re-use the much needed scientific data and information.

Meanwhile, this situation is further aggravated by the publishers' business demand, which requires the copyright of these scholarly publications to be handed over to them. By taking over the copyrights of as well as imposing various conditions on these publications, these publishers are free to control and exploit the access and use of the data and information. While there is an agreement amongst the publishers around the world to allow these scholarly publications to be placed in open access repositories, none of Malaysian journal publishers has a policy to the same effect in place. Hence, it could be perceived that the access to and re-use of the copyright materials require prior-consent from the publishers before they could be archived in open access repositories.

At the same time, the Malaysian government has adopted an IP commercialisation policy modelled after the US Bayh-Dole law, which imposes a duty on the public research institutions to patent and license publicly funded research output. The IP commercialisation strategy, which is being practised in Malaysia since 2006 could lead to the incidence of information locked-up, such as delayed publication to give way to patents as well as data withholding and secrecy in the form of trade secret and confidential agreements. [4]

For all intents and purposes, the primary aim of all publicly funded research is to create new knowledge in an environment that embodies the principles of freedom of inquiry and unrestricted dissemination of research output as public goods. Undoubtedly, restrictions over the access and re-use of scientific data and information do not meet the aim of publicly funded researches to support extensive distributions and make scientific data and information available at no cost to the public.

The enclosure of scientific data and information diminishes the public domain and leads to a host of lost opportunity costs at both national and international levels. This is due to the fact that gaining access to scientific data and information is becoming increasingly important in the society that aims to be innovative in their economy.[5] Simultaneously, it also limits the extent of the benefits from wider diffusion of research findings, and contributes to widening the gap between the level of scientific capabilities and innovation capacities between the developed and developing countries.[6]

To avoid further lost of opportunity, a concrete and practical measure must be taken to unlock the enclosure of scientific data and information. This can be carried out by the use of an open approach to foster further innovation to stress the importance of connections to various knowledge sources as part of innovation strategies. Increasingly throughout the world there are calls for publicly funded knowledge to be

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[4] See, Julie M. Esanu and Paul F. Uhlir, (Eds.), 'Open access And The Public Domain In Digital Data And Information For Science Proceedings Of An International Symposium', The National Academies Press, Washington ,2004, 5.

[5] Organisation for Economic Co-Operation and Development, 'OECD Principles and Guidelines for Access to Research Data from Public Funding' (2007) 14, <http://www.oecd.org/dataoecd/9/61/38500813.pdf> (at 21 January 2010) 9.

[6] John Houghton, Colin Steele and Peter Sheehan, 'Research Communication Costs in Australia: Emerging Opportunities and Benefits: A Report to the Department of Education, Science and Training' (Centre for Strategic Economic Studies Victoria University, Melbourne, 2006) 99.

released in a manner that allows open access and a higher level of re-using them.[7]

As Malaysia is not a member of the OECD, and none of its public research funding agencies and institutions is a signatory of Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities, the idea of granting open access to publicly funded research output as one of the catalysts for innovation does not sink well in the mind of Malaysian policy makers. Hence, they need to be convinced not only of the benefits of open access but also of the close link between access to gaining knowledge and promoting innovation.

III. ACCESS TO KNOWLEDGE AS A CATALYST FOR INNOVATION

Innovation can be defined as a process of taking new ideas effectively and profitably through to satisfied customers. In a broader sense, innovation can take place when new products or new processes spread through imitation or when gradual improvements resulting in higher productivity are made.[8] There are five types of innovation, which can be categorised as products, processes, new markets, new input and new organisational forms.[9]

Access to knowledge, which is derived from raw data and information has long been recognised as one of key factors underpinning innovation.[10] This recognition is based on the fact that, every innovation makes use of previously gained knowledge.[11] The argument that the path to innovation is dependent on the use of the previous one was made by Sir Isaac Newton in words that are among the most frequently quoted in the area of innovation: 'If I have seen further it is by standing on the shoulders of Giants'.

As innovation is the application of knowledge to generate new one, it deals with the modalities of converting data and information into ideas to become a disruptive invention.[12] In this regard, scientific data and information are not only seen as necessary, but it also acts as the currency of creativity and innovation.[13] By making these data and information easily accessible and re-useable, it could help synergies innovation as they are the component of knowledge.[14]

The emphasis on the diffusion and use of knowledge and information has changed the linear model of innovation into a non-linear one, known as chain-link model of innovation. In a chain-link model of innovation, ideas for innovation are not completely linear, as these ideas can stem from many sources such as firms, laboratories, academic institutions and consumers who are member of society,[15]

The non-linear model of innovation has opened the opportunity for the grassroots innovators to play their roles as part of the chain in the national innovation system. Essentially, gaining access to new research results and the capability to ensure timely access by grassroots innovator to the relevant stocks of knowledge is a vital key to spur further innovation.[16] This is the stage where open access system to the information and data play its significant roles.

IV. OPEN ACCESS AS THE INNOVATION DRIVER

According to Fitzgerald et. al, open access regime becomes an essential element in fostering innovation and creativity in the informative economy as the ability to gain knowledge is a critical factor in creative industries, academic researches and industrial innovations.[17] The link between openness and innovation has also been highlighted by Fry et. al who argue that openness has been a key feature of science that can be traced back to early modern Europe.[18] Another scholar, Norris also argues that open access to research output increases the rate of scientific discovery and it also has a role as the driver of innovation.[19]

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[7] Brian Fitzgerald, 'Australia Paper Open Content Licensing (OCL) for Open Educational Resources', Paper commissioned by the OECD's Centre for Educational Research and Innovation (CERI) for the project on Open Educational Resources, 2007, 3, < www.oecd.org/edu/oer> (at 5 October 2010).

[8] UNCTAD Secretariat, 'Information Economic Report 2007-2008' .

[9] Jan G. Lambooy, 'Knowledge and Urban Economic Development: An Evolutionary Perspective' (2002) 39 *Urban Study* 1025.

[10] UNCTAD Secretariat, 'Information Economic Report 2007-2008' (2007).

[11] Jon-Arild Johannessen, Bjorn Olsen, Johan Olaisen, 'Aspects of Innovation Theory Based on Knowledge-Management', International Journal of Information Management 19 (1999), 123.

[12] Ioan Voicu, Towards Innovative Societies, 22 August 2007, <http://www.onlineopinion.com.au/view.asp?article=6262&page=0> (at 5 October 2010)

[13] Terry Cutler, 'Innovation and Open access to Public Sector Information' in Brian Fitzgerald (ed), *Legal Framework for e-Research: Realising the Potential* (Sydney University Press, Sydney, 2008) 25.

[14] Robinson Esalimba and William New, 'Spurring Local Innovation in Africa By Improving Access to Information' (2009), <http://www.ip-watch.org/2009/10/19/spurring-local-innovation-in-africa-by-improving...> (at 25 March 2010).

[15] 'The Knowledge-Based Economy' (Organisation for Economic Co-Operation and Development, 1996), 14.

[16] Ibid, 15.

[17] Brian Fitzgerald, Anne Fitzgerald, Mark Perry, Scott Kiel-Chisholm , Erin Driscoll, Dilan Thampapillai, Jessica Coates , 'OAK Project Report No. 1: Creating a Legal Framework for Copyright Management of Open access Within the Australian Academic and Research Sector' (2006) *Report for the Department of Education Science and Training (DEST)*, 6 <http://eprints.qut.edu.au/6099/>, (at 5 October 2010).

[18] Jenny Fry, Ralph Schroeder and Matthijs des Besten, 'Open Science in e-Science: Contingency or Policy?' (2009) 65(1) *Journal of Documentation* 9.

[19] Ray P. Norris, 'How to Make the Dream Come True: The Astronomers' Data Manifesto' (2007) 6 (Supplement) *Data Science Journals*, 116.

Meanwhile, Brown et al who write on the advantages of open access compared to the traditional print publication, state that open access enables scientists to begin transforming their literature into something far more useful than the electronic equivalent of millions of individual articles in rows of journals on library shelves. Evidently, freeing the information in the scientific literature from the fixed sequence of pages and the arbitrary boundaries drawn by journals or publishers, opens up myriad new possibilities for navigating, integrating, mining, annotating, and mapping connections in the high-dimensional space of scientific knowledge. [20]

Henry Chesbrough in "Open Innovation", cautions that the right balance must be struck between the interest of the owner of the research output and the public interest over the scientific data and information it contains. While the IP rights of the owner must be secured and protected, Chesbrough considers open collaboration to be the best practice for instigating innovation.[21]

There are various reports and submissions which promote open access for innovation. In his report to the Australian government, an Australian policy leader, Dr. Terry Cutler stated that innovation requires an open model system, which is sharp contrast to the closed models of neo-classical economics.[22] For Cutler, it is obvious that freedom to access to and use of the prior art and knowledge in the exploration and development of new knowledge and insights is essential to creativity and innovation.[23]

Houghton et al in a report prepared for the Australian Department of Education, Science and Training mention that broad access to publicly-funded information resources are beneficial for innovation. Among the benefits are:

i. it promotes new researches and new types of research;
ii. it facilitates the education of new researchers, enables the exploration of topics not envisioned by the initial investigators;
iii. it permits the creation of new data sets when data from multiple sources are combined; and
iv. it promotes interdisciplinary, inter-sectored, inter-institutional, and international research.

The argument that open access of information and knowledge sharing could spur further innovation is also well received at inter-governmental level. For instance, the United Nations Conference on Trade and Development (UNCTAD) in one of its reports has stated that abundant information creates a pro-innovation force by itself, whereby with the fall in the cost of access to information, the possibility of innovating is open to much wider strata of economic actors [24] Besides UNCTAD, another influential inter-governmental organisation, the Council of European Union also believes that open scientific information in both publications and data, could accelerate further innovation.[25]

The Ministers of the OECD countries also agree that open access to and unrestricted use of data, information and knowledge promotes scientific progress and contributes decisively to the advancement of scientific research and innovation. [26] The OECD Ministers in their Declaration reaffirm that public rights to access the research data from public fundings have also highlighted that knowledge creation and diffusion are increasingly important as drivers of innovation, sustainable economic growth and social well-being.[27]

In line with the Declaration, the OECD switches its main emphasis on its research and innovation policies in universities, from the direct formation of commercial IP to the removal of barriers to the free dissemination of knowledge goods to the public. [28] From the above information, it clearly states that open access systems, which receives tremendous support from all around the world, could significantly facilitate the formation of innovative society in Malaysia.

V. FORMULATING OPEN ACCESS POLICY

The Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities and the Bethesda Statement on Open Access Publishing propagate open access as a mean to open up access to research output, data sets, scientific information and scholarly publications especially those, which are publicly funded. However, unlike the Bethesda Statement, which only focuses on open access publishing, to facilitate the formation of innovative society, a comprehensive model of open access needs to be adopted.

[20] Patrick O. Brown, Michael B. Eisen and Harold E. Varmus, 'Why PLoS Became a Publisher' (2003) 1(1) *PLOS Biology* 1.
[21] Michael Burkett, Ian Finley. 'Balancing IP Security and Open Innovation', Supply Chain Management Review, New York: Sep 2007. Vol. 11, Iss. 6; pg. 12.
[22] Terry Cutler, 'Innovation and Open access to Public Sector Information' in Brian Fitzgerald (ed), *Legal Framework for e-Research: Realising the Potential* (Sydney University Press, Sydney, 2008) 29.
[23] ibid.
[24] UNCTAD Secretariat, 'Information Economic Report 2007-2008' (2007).
[25] Council of the European Union, 'Council Conclusions on Scientific Information in the Digital Age: Access, Dissemination and Preservation' (2007) 1, <http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/intm/97236.pdf> (at 28 February 2010).
[26] Organisation for Economic Co-Operation and Development, 'Declaration on Access to Research Data From Public Funding' (2004), <http://www.oecd.org/document/0,2340,en_2649_34487_25998799_1_1_1_1,00.html> (at 25 February 2010).
[27] ibid.
[28] Simon Marginson, 'Open Source Knowledge and University Rankings' (2009) 96 *Thesis Eleven* 18.

This means that, besides open access publishing, which only makes scholarly publications available, there should be an open access procedure applying to data, patents, software and registered designs. Based on the innovation theory, it is believed that a comprehensive model of open access such as this would open up the entire range of scientific data and information for public access and re-use.

This open access policy could be mandated either by the public funding agencies or the universities or even the public research institutions. The policy could also mandate self-archiving in open access repositories, known as the green road of open access. On the other hand, there should also be a set of separate repositories for scientific data, patents, software and designs. In addition, the policy could also mandate or encourage publishing of scholarly publication in open access journals, which are the golden road of open access. In order to honour the scholars' academic freedom, they should be allowed to publish their works in any journals of their choice, provided it does not jeopardise the scholars' rights to archive a copy of the publication in their institutional or departmental repositories.

The legal obstacle posed by IP law could be resolved in an open access policy by applying a legal tool that can generate a generic permission or clearance of legal rights (in copyright, patent or design) in advance (usually subject to conditions) that can be implemented before or at the point of use. This is known as an open licensing model. In this regard, Creative Commons (CC) and Science Commons (SC) licences are seen as the most appropriate models of open licensing. [29]

Attaching a CC badge to the scholarly publication indicates that its contents are licensed to allow the users to reproduce, recast and communicate the content in as long as they provide proper attribution. A more restrictive CC license will allow access and re-use as long as the users do not use it for a commercial purpose and must also share their innovations with the open access community.

As for Science Commons, it is more suitable to license non-published scientific data and information as it is suitable to be attached to open data and open patent information. In the meantime, a GNU/General Public License could be issued to allow public access and re-use of the software code and design as a part of software Open Source Software (OSS) licensing procedures. For industrial designs, the Open Design Hardware license, developed by the Open Design Organisation, could be used to allow access to and re-use of registered industrial designs.

Nevertheless, not all scientific data and information are suitable for open licensing, even where they are publicly funded. As a general rule, open licences will be advocated in the context of scientific data and information which is subsidised by public fund and upon assurance that privacy or national security is not at stake.[30] There is also a need to balance the open access policy with research commercialisation policies, which are currently adopted in Malaysia. As the latter are mainly concerned with patentable research output, the open access policy ensures that prior art requirements of the patent laws will not be upset by premature disclosure or publication of the invention.

VI. CONCLUSION

As a conclusion, while nurturing innovation enablers and creating an innovation ecosystem, continuous innovation practice requires the public to be closely connected with the knowledge dissemination and transfer process. This is due to the fact that, investment in research and education *per se* will produce neither innovators nor innovation. Likewise, creativity and imagination alone will not be sufficient to transform citizens either as inventors or innovators. What is equally needed is the access to and re-use of scientific data and information, which are the best innovation input a potential innovator could get. Providing open access to scientific data and information is undoubtedly very crucial in the process of becoming innovative.

Sadly though, the rigid exploitation of IP rights by the "old-school" publishers has resulted in Malaysian scientific data and information remaining trapped behind closed-access and subscription-based models. The lack of advance towards an advance permission culture among Malaysian scientists and researchers has also caused scientific data and information, including that funded by taxpayers' money, to be circulated exclusively among a closely connected or networked privileged few.

Inevitably, all these scenarios have created a huge stumbling block to the accessibility and re-usability of scientific data and information in Malaysia. Consequently, it could reduce Malaysian capacity for innovation. Until a new set of positive and accessible systems and policies are in place, the drive towards innovative society could remain a distant dream.

[29] Brian Fitzgerald, 'Open Content Licensing (OCL) for Open Educational Resources', Paper commissioned by the OECD's Centre for Educational Research and Innovation (CERI) for the project on Open Educational Resources, 2007, 11, <www.oecd.org/edu/oer> (at 5 October 2010) .

[30] Brian Fitzgerald and Kylie M. Pappalardo, (2007) The Law as Cyberinfrastructure.
CT Watch Quarterly 3(3):pp. 51-57.

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